



Getting Science into International Climate Policy: CCS in the UNFCCC

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IEA Greenhouse Gas R&D Programme



- A collaborative international research programme founded in 1991
- Aim: To provide information on the role that technology can play in reducing greenhouse gas emissions from use of fossil fuels.
- Focus is on Carbon Dioxide Capture and Storage (CCS)
- Producing information that is:
 - Objective, trustworthy, independent
 - Policy relevant but NOT policy prescriptive
 - Reviewed by external Expert Reviewers
- Activities: Studies and reports (>250); International Research Networks: **Risk, Monitoring, Modelling, Wells, Environmental Assessment, Oxy, Capture, Social Research, Solid Looping**; GHGT conferences; IJGGC; facilitating R&D and demonstrations eg Weyburn; Summer School; peer reviews.



BG GROUP



CEZ GROUP



TOTAL

ALSTOM



EPRI

CIAB



ExxonMobil

ConocoPhillips



ieaghg



Schlumberger

DOOSAN Doosan Babcock



SCOTTISHPOWER

EnBW



REPSOL YPF

e.on



VATTENFALL

Masdar CARBON

B&W power generation group

Enel L'ENERGIA CHE TI ASCOLTA.

GLOBAL CCS INSTITUTE

JGC

RWE The energy to lead

Statoil

INSTITUTO DE INVESTIGACIONES ELECTRICAS

UNFCCC and CCS



Six negotiating bodies relevant to CCS:

UNFCCC:

- COP – Conference of the Parties to the UNFCCC (194 Parties)
- AWG-LCA – Ad Hoc Working Group on Long-term Cooperative Action
- ADP – Ad Hoc Working Group Durban Platform for Enhanced Action

Kyoto Protocol:

- CMP – Conference of the Parties serving as a Meeting of the Parties to the Kyoto Protocol (192 Parties, 37 ‘developed’ countries)
- AWG-KP – Ad Hoc Working group on Further Commitments for Annex I Parties under the Kyoto Protocol (Post 2012)
- SBSTA – Subsidiary Body for Scientific and Technological Advice

Kyoto Protocol and CCS



- 2008 - 2012 (Kyoto 1st Commitment Period)
 - Developed country emission commitments
 - CCS included in Kyoto Protocol Art 2.1
 - IPCC GHG Guidelines 2006 allows CCS to be reported
 - Clean Development Mechanism (CDM) – Policy mechanism for rewarding CO₂ reduction in developing countries. Project-based carbon credits. >4600 projects >1,000MtCO₂
- Post 2012 – CDM ?



Kyoto Protocol and CCS



Considering CCS in CDM since 2005

- 2005 CDM Executive Board (EB) considers two new CCS methodologies
 - 2005 CMP1 Montreal
 - referred to SBSTA
 - 2006 SBSTA Technical workshops - Consideration of technical and policy Issues
 - On agenda of each SBSTA meeting
 - 2007 and 2008 Submissions from Parties and NGOs – two synthesis reports
 - 2008 Decision due at CMP4/COP14 Poznan – failed
 - CMP request EB to look at implications
 - 2009 EB commission ‘Experts Report’
 - 2009 Decision due at CMP5/COP15 Copenhagen – failed
 - 2010 CMP6/COP16 Cancun
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- All CCS CDM reports and background <http://cdm.unfccc.int/about/ccs/index.html>

Key Issues of Concern



Included

- Timescales of benefits vs liability
- Impact on CDM market
- Scale and impacts of leakage
- Furthering use of fossil fuels – sustainable development
- Role of CCS in climate change mitigation

Since CMP 5 (2009)

- Non-permanence
- Monitoring and verification
- Environmental impacts - ecosystems, climate (“massive catastrophic release”)
- Project boundaries and transboundary issues
- Liability
- Perverse outcomes
- Safety
- Insurance and compensation for leakage

Negotiations characterised by a few countries having strong views against CCS – but need consensus to progress.

Progress in Cancun! 2010



Decision 7/CMP.6

- CCS is eligible provided that certain issues are addressed
- Issues include site selection, modelling, monitoring, risk assessment, liabilities (short and long-term) (ie CMP 5 list)
- SBSTA to develop new “Modalities and Procedures” (M&Ps) which address the issues

Work programme for 2011:

- Submissions and ‘Synthesis report’
- Technical workshop (technical and legal expertise)
- UNFCCC to draft M&Ps for SBSTA35 Durban Dec’11

IEAGHG decided to use its Research Networks to address Cancun issues



IEAGHG Research Networks



- **Risk Assessment**
- **Monitoring**
- **Modelling**
- **Wellbore Integrity**
- Also: **Oxy-firing; Post Combustion Capture; Solid Looping, Social Research**
- Workshop series: **Environmental Impacts**

- Bring together international key groups of experts to share knowledge and experience on regular basis
- Identify and address knowledge gaps
- Publish report of meetings - discussions, conclusions and recommendations (ppts on web site)
- Benefit experts and wider stakeholders

More info at www.ieaghg.org

IEAGHG Research Networks



Cancun Decision issues:

- In the area of the **Monitoring Network** (Potsdam, June 2011):
- *“Stringent monitoring plans shall be in place and be applied during and beyond the crediting period in order to reduce the risk to the environmental integrity of carbon dioxide capture and storage in geological formations;”*
- In the area of the **Modelling Network** (Perth, April 2011):
- *“Further consideration is required as regards the suitability of the use of modelling, taking into account the scientific uncertainties surrounding existing models, in meeting the stringency requirements of such monitoring plans;”*

(UNFCCC 7/CMP.6 2010)



IEAGHG Research Networks



Cancun Decision issues:

- In the area of the **Risk Assessment Network** (Pau, June 2011):
- *“A thorough risk and safety assessment using a methodology specified in the modalities and procedures, as well as a comprehensive socio-environmental impacts assessment, shall be undertaken;*
- *The risk and safety assessment shall include, inter alia, the assessment of risk and proposal of mitigation actions related to emissions from injection points, emissions from above-ground and underground installations and reservoirs, seepage, lateral flows, migrating plumes, including carbon dioxide dissolved in aqueous medium migrating outside the project boundary, massive and catastrophic release of stored carbon dioxide, and impacts on human health and ecosystems, as well as an assessment of the consequences of such a release for the climate”*

(UNFCCC 7/CMP.6 2010)

Science Intersects with Policy



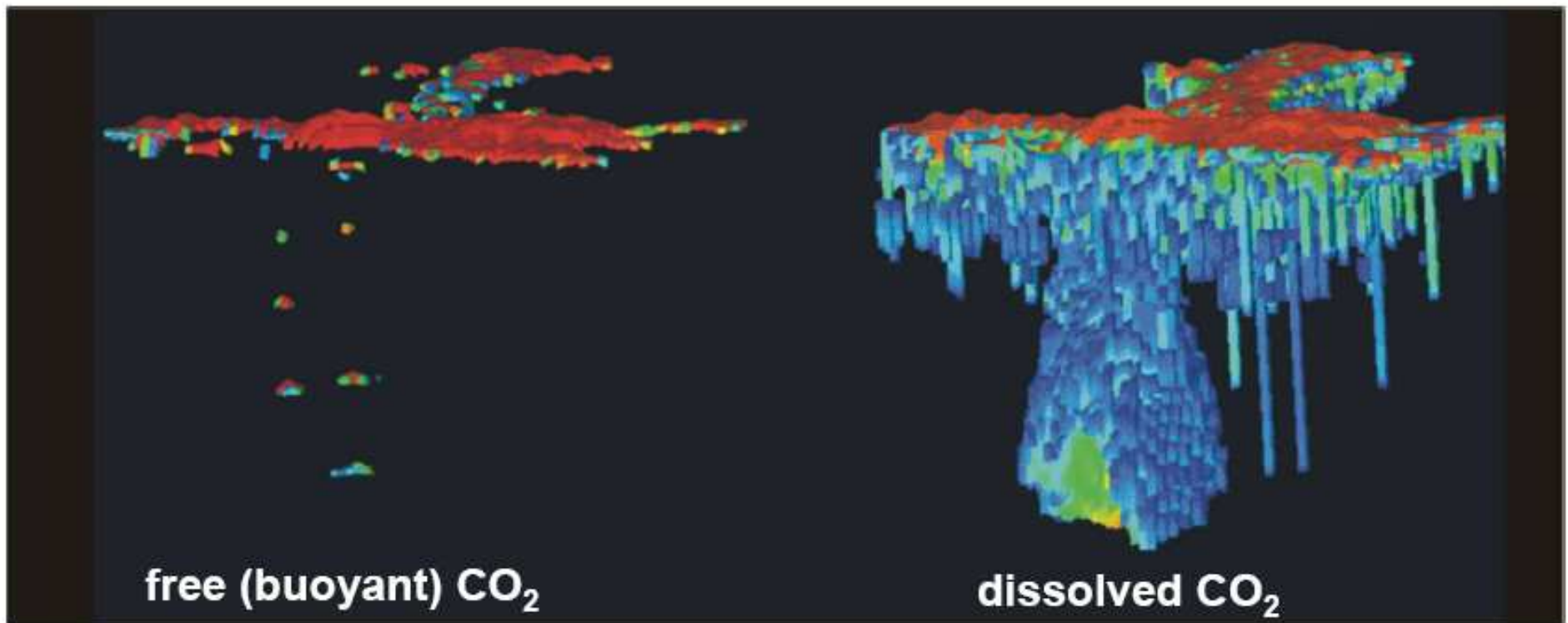
Technical Workshop, Abu Dhabi, 7-8 Sep 2011

- Brought technical expertise to UNFCCC negotiators
- Technical experts on site selection; modelling; accounting; project boundaries; transboundary; risk assessment; environmental impacts; monitoring; liability (28 talks, several members of IEAGHG Networks).
- Results and experiences from real projects and natural systems, to support modelling and risk assessments
- Good Q&As from CCS negotiators and others



Sleipner predicted stabilization

(250 years after injection)

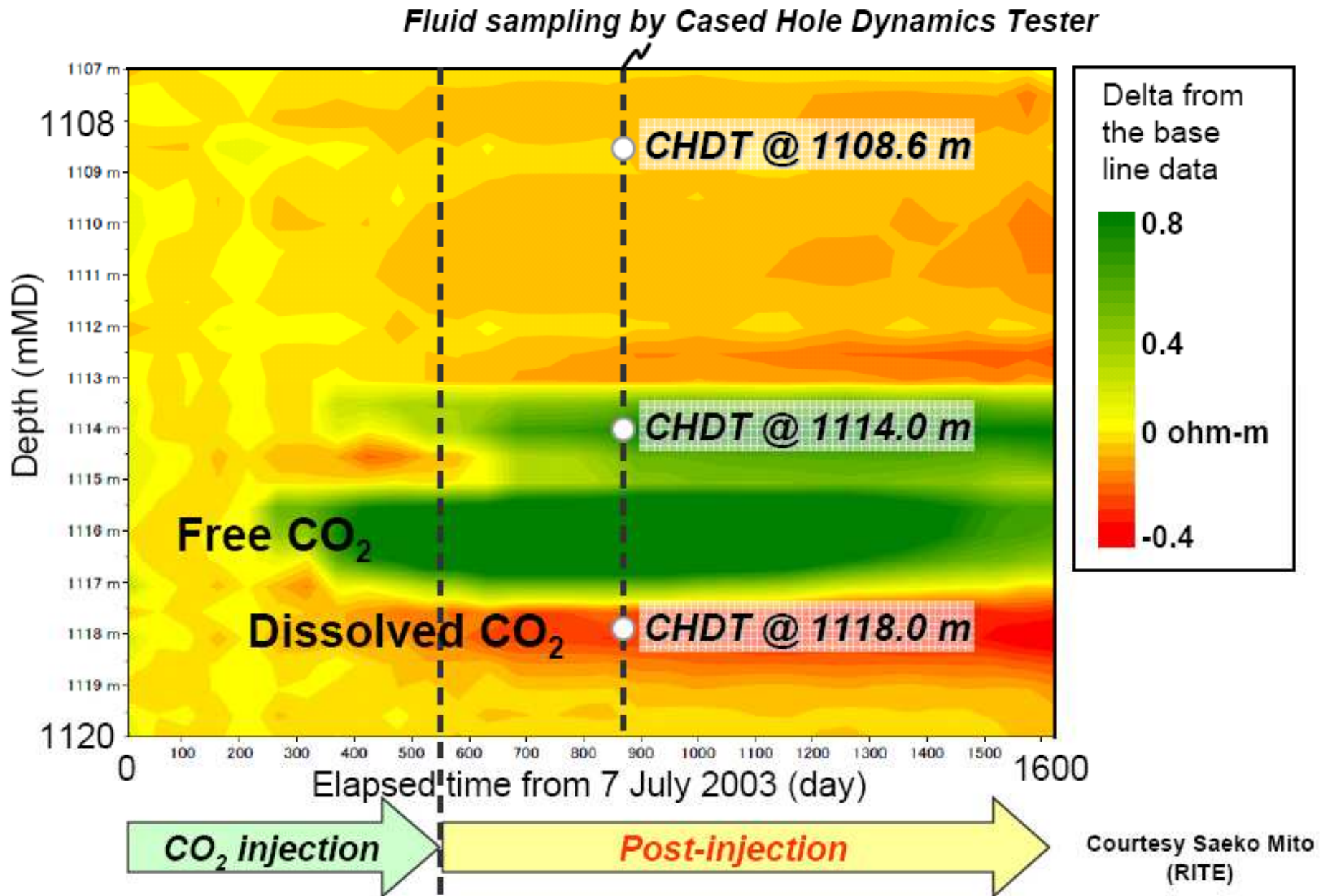


[Courtesy Erik Lindeberg]

Onset of dissolution: gravitational stabilization

Post-injection monitoring at Nagaoka (Japan)

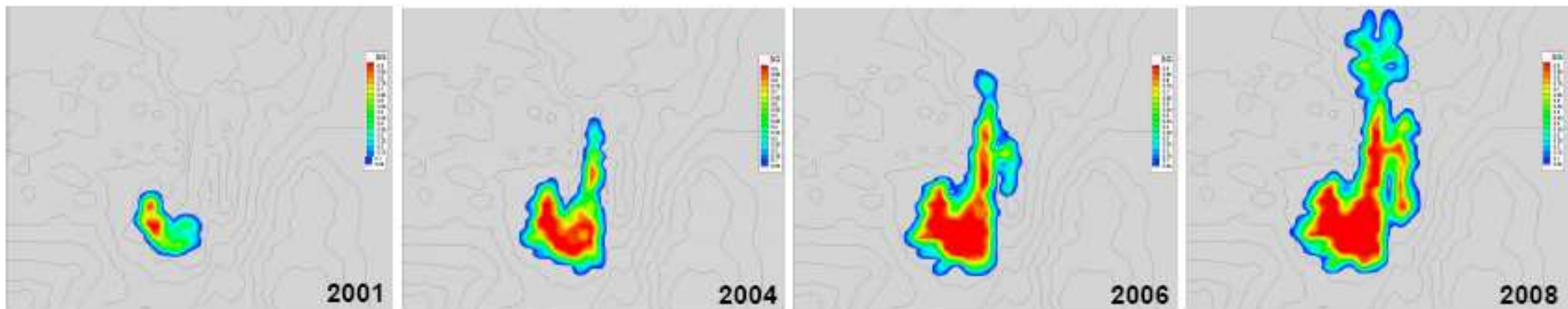
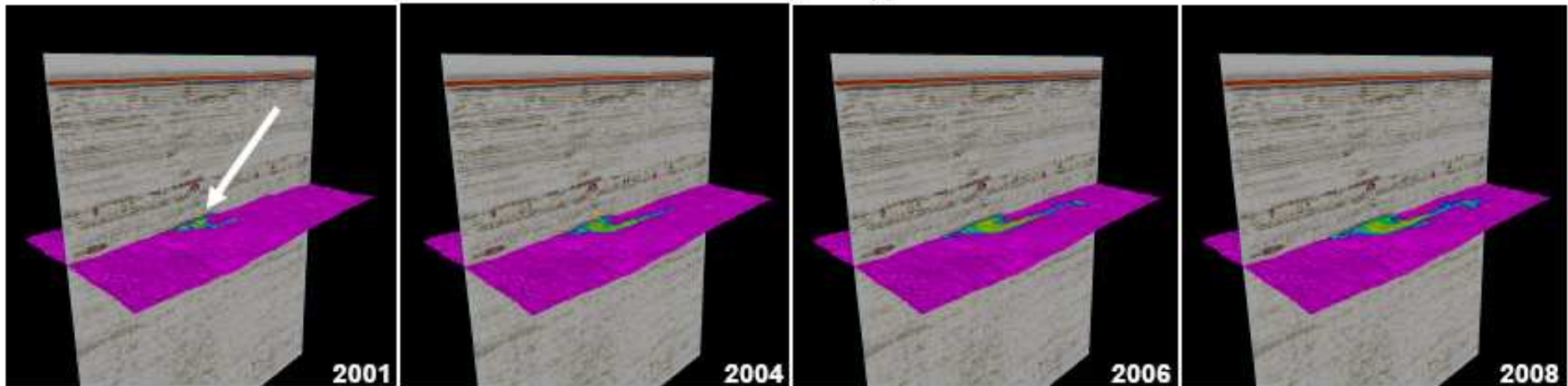
Courtesy A.Chadwick 2011



History-matching plume migration at Sleipner (3)

Courtesy A.Chadwick 2011

observed layer growth

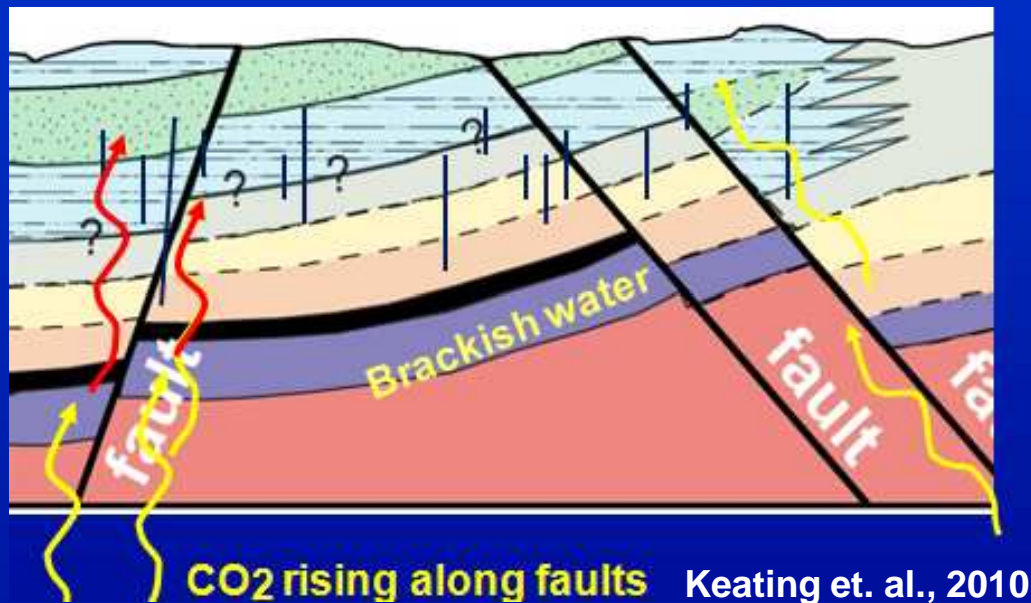


numerical flow simulation of layer growth

Match imperfect but sufficient to prove understanding of process

Scope for divergence in long-term predictions is limited

Brine Impacts: Natural Analog Chimayo, New Mexico, USA



- Integrated field, lab and modeling.
- Trace elements are strongly associated with brackish water; in-situ mobilization is negligible
- Mineral precipitation decreases metal concentrations

Impact of Technical Workshop



Technical Workshop, Abu Dhabi, 7-8 Sep 2011

Outcomes:

- Number of issues of concern shrunk considerably
- Liability remained as genuine concern – part technical, part policy issue
- UNFCCC then produced draft Modalities and Procedures (M&Ps) drawing upon the workshop and synthesis report, 20 pages of detail, the basis for negotiations in Durban



CMP7/COP17 Durban 2011 Negotiations on CCS CDM



- Over 32 hours of formal negotiations
 - “What is this carbon capture?”
 - “Do we have technology to monitor groundwater impacts?”
 - “Definition of seepage should include CO₂ dissolved in groundwater migrating to ocean or atmosphere”

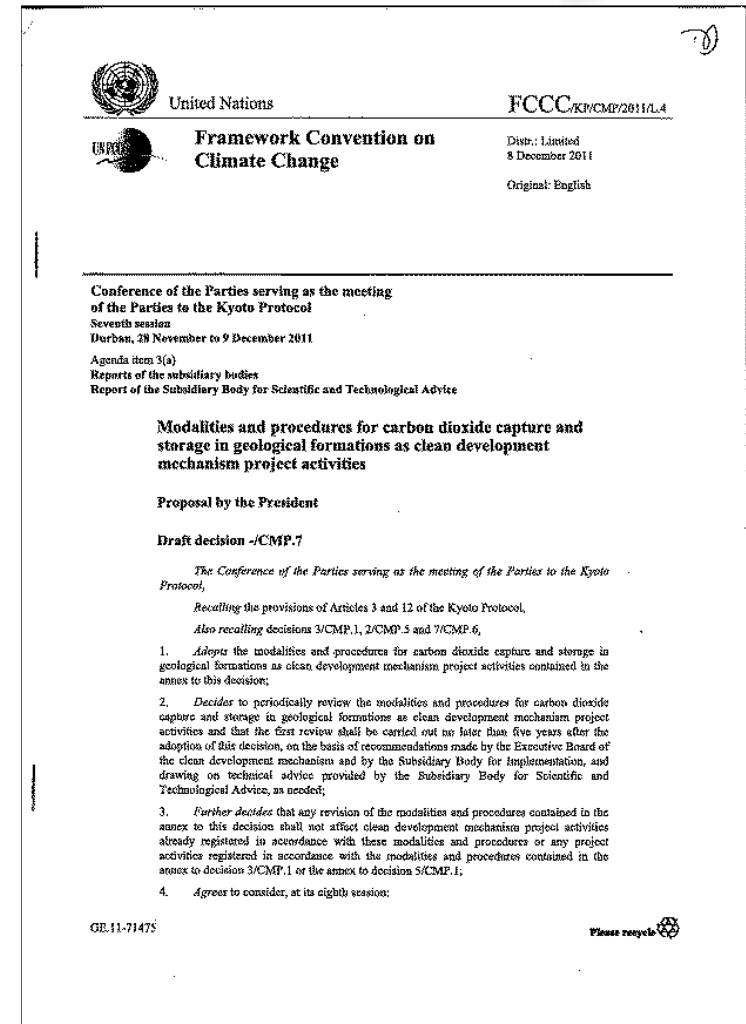


Courtesy H.Olson UT

Modalities & Procedures for CCS in CDM



- Agreed and adopted Modalities and Procedures !
- Decision 10/CMP.7 (final draft was FCCC/KP/CMP/2011/L.4)
- <http://unfccc.int/2860.php>



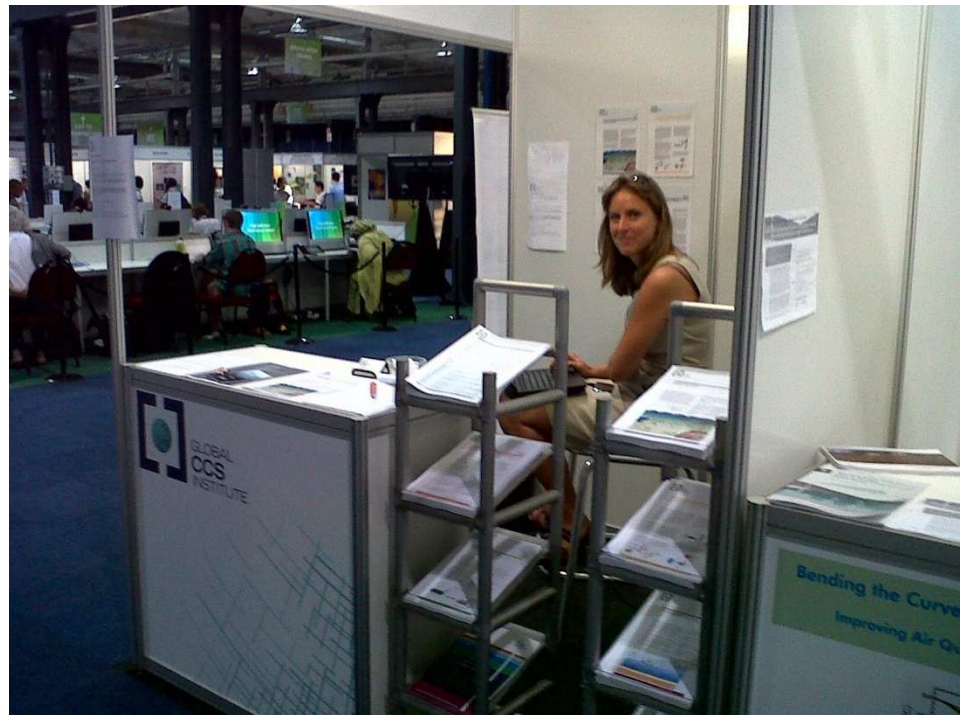
Information into UNFCCC



- SBSTA work (including occasional workshops)
- Side events (official, unofficial)
 - One official Side event in Durban on CCS
- Booths



Courtesy
H.Olson UT



Significance of CCS M&Ps from Durban



- **Allows CCS to be CDM project activity and earn CERs**
- Create incentives / signal for CCS in developing countries
 - CDM key international mechanism supporting low-C technology in developing countries
- Legitimises CCS as valid technology for developing countries
- Establishes precedence-setting regulatory framework for CCS funded under international mechanisms
- **Assisted and enabled by getting science and technology into the UNFCCC negotiations**





CCS in CDM

Work programme for 2012:

- UNFCCC work on CDM documents (Standards, Procedures, Guidelines, Forms)

Unresolved issues:

- Transboundary CCS
- Global reserve of CERs
 - Submissions (by 5 March)
 - Consideration by SBSTA 36 (May, Bonn)
 - Draft decision to CMP8/COP18 (Dec, Qatar)

Durban Outcomes CMP7/COP17



Durban Platform for Enhanced Action

- New negotiating process established (AWG on the Durban Platform for Enhanced Action);
- Recognises that current emission pledges inadequate $<2^{\circ}\text{C}$
- Process to develop “protocol, another legal instrument or outcome...with legal force” for all Parties
- Timeline;
 - ▶ Process to completed no later than 2015
 - ▶ Implemented by 2020



Photograph courtesy of
IISD/Earth Negotiations Bulletin

Durban Outcomes CMP7/COP17



AWG KP: Parties agreed to have Kyoto Protocol 2nd Commitment period

- 2nd Commitment period commences 1st January 2013 and ends 31 December 2017 or 2020
 - Continued project-based mechanisms (CDM)
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- **AWG LCA:**
 - New Market Mechanism to be developed
 - Technology Mechanism
 - Green Climate Fund



Photograph courtesy of
IISD/Earth Negotiations Bulletin



UNFCCC documents on CCS at
<http://cdm.unfccc.int/about/ccs/index.html>
and from Durban <http://unfccc.int/2860.php>

Acknowledgements

To all members of the IEAGHG Research Networks in 2011

Thank you